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Europe to South America

DESPITE the failure, near the goal, of the two Portuguese naval aviators, Captains Cabral and Coutinho, to link their country via the air route with Brazil, their gallant attempt both deserves recognition and affords food for some thought.

To begin with, the three principal legs of journey which were completed, of 700, 800 and 900 miles length, respectively, required an extremely fine piece of navigation by compass and sextant. If it is considered that these flights averaged in length about two-thirds the distance from Newfoundland to the Azores (1200 miles); that the last stopping place, St. Paul's Rock, is a mere speck in the waste of the South Atlantic; and that the two fliers only had the assistance of a few vessels of the Portuguese navy, the achievement of Captains Cabral and Coutinho will be better appreciated. Even though they failed to reach the South American mainland, their names will live in the annals of aviation alongside with the names of other more fortunate pioneers of the air.

But this 2700 mile flight has still another aspect. The Portuguese transatlantic attempt was more than a mere sporting venture: as a matter of fact it was the first attempt to connect Europe with South America via a workable commercial airway. The route chosen is more favored by nature than even the best route across the North Atlantic, by way of the Azores, in that the maximum overseas distance is 900 miles long as against 1200 for the latter, and in that cyclonic disturbances are less frequent. Hence it is to be expected that the first transatlantic commercial airway will lead from Europe to South America and not to the United States.

We have, some time ago, commented on the projected German-Spanish enterprise which is to use Zeppelins of a size far exceeding anything built heretofore between Cadiz and Buenos Aires. But this project, which seems to be nearing realization, is not the only undertaking of its kind. The French department of civil aviation has for some time been engaged in establishing the ground organization of a route which will lead from Casablanca, the present terminus of the France to Morocco air line, down the West coast of Africa to Dakar. This work, it is stated, will be completed in about a year by which time the French expect to have built the machines capable of crossing the South Atlantic from Dakar to Pernambuco, Brazil.

And thus Europe is unceasingly at work to outstrip in aeronautical achievement America, the birthplace of the airplane and of the flying boat. And yet, three years ago we had in the Navy-Curtiss four-engined flying boats a type of aircraft which, with some modifications, could have inaugurated an aerial mail service between Europe and South America over the very route flown by the two Portuguese aviators.

In the last analysis this flight should call the attention of American seaplane constructors to the large field South America offers to their enterprise.

Listing Aviation Facilities

PILOTS of seaplanes will welcome the survey of landing places and aviation facilities of the Atlantic coast which the National Advisory Committee for Aeronautics has just made public. This survey has the merit of being brief and to the point, yet it embodies all a seaplane pilot wishes to know about landing places he will find on a cruise along the coast. Ewing Easter, who collected and compiled these data, deserves to be congratulated for his valuable work, which is by the way only a section of an enterprise of much larger proportions. Indeed, Mr. Easter is continuing his pioneer flight along the Gulf and intends to wind it up by flying up the Mississippi and back to New York by way of the Great Lakes. When he will have completed his cruise, there will become available a detailed survey of shore landings extending over a total distance of 9000 miles, which will be of considerable assistance to seaplane pilots.

The National Advisory Committee also deserves much credit for encouraging this kind of work, which has primarily practical value. As a matter of fact, we should like to see the N.A.C.A. go one step further and complete the survey just published by issuing for the route in question "pilots' directions" which would give the distance between the various landing places, landmarks, compass course, etc. The U. S. Air Mail Service has issued such pilots' directions for the New York-San Francisco airway, and the publication has been of great help to civil pilots who have used that route.

As the lack of airdromes seems to direct our civil aviation more and more toward the use of the shores and waterways, and the New York to Florida and Cuba route is for this reason bound to become before long our most frequented civil airway, the publication of air pilots' directions for the Atlantic coast appears timely. It is, therefore, eminently desirable that some existing agency undertake the work in question without further delay, for even if the Wadsworth Bill is passed by the House an appreciable amount of time is likely to pass before the Bureau of Civil Aeronautics for which this bill provides will be capable of doing effective work. The N.A.C.A. seems at the time best fitted for issuing said pilots' directions, particularly if it would work in conjunction with the Hydrographic Office of the U. S. Navy.

What we have said above with regard to air pilots' directions for the Atlantic coast applies with equal force to the Pacific coast and to the principal waterways of the United States. To collect the necessary information on aviation facilities, distances, landmarks, etc. may at first sight seem a huge enterprise. However, considering the speed at which aircraft travel, and the excellent observation platform they afford, it will be found that this work can not only be carried out in a comparatively short time but also that the expenditure involved will be very small in contrast to the great importance of the undertaking.

The Wright 6-Cylinder Airship Engine

First American High Power Airship Engine Develops 350-400 hp. and has Low Fuel and Oil Consumption

The Wright Aeronautical Corp. has just completed a 50-hr. test on a new six-cylinder airship engine known as the Model D1. The chief characteristics of this engine are as follows:

SPECIFICATIONS

6 cylinder, 7 in. bore x 8 in. stroke.	
Weight complete with carburetors, magnetos, etc., but without propeller hub, generator or starter	1320 lb.
Weight per hp.	3.3 lb.
Fuel consumption	.475 lb. per b.hp. (test figures)
Oil consumption	.008 " " " " "
Length overall	71 1/16 in.
Width overall	25 5/16 in.
Height overall	41 3/16 in.

The development of this engine was a very interesting one because, while the engine recently tested was built to the order of the Navy Department, the Wright Corporation laid out the design and made a comprehensive test on an experimental, single-cylinder of the same design as that used on the complete engine. The results of the tests on the single-cylinder were so satisfactory that the Navy Department ordered three complete engines from the Wright Corporation. This order was placed June 28, 1921, and during the period between the above date and March 20, 1922, the engine was completely designed, constructed, assembled and given a standard 50 hr. test. The Wright Co. believes that this is an almost unequalled achievement especially when it is considered that no engines of this type and size has been constructed up to this time either in this country or abroad.

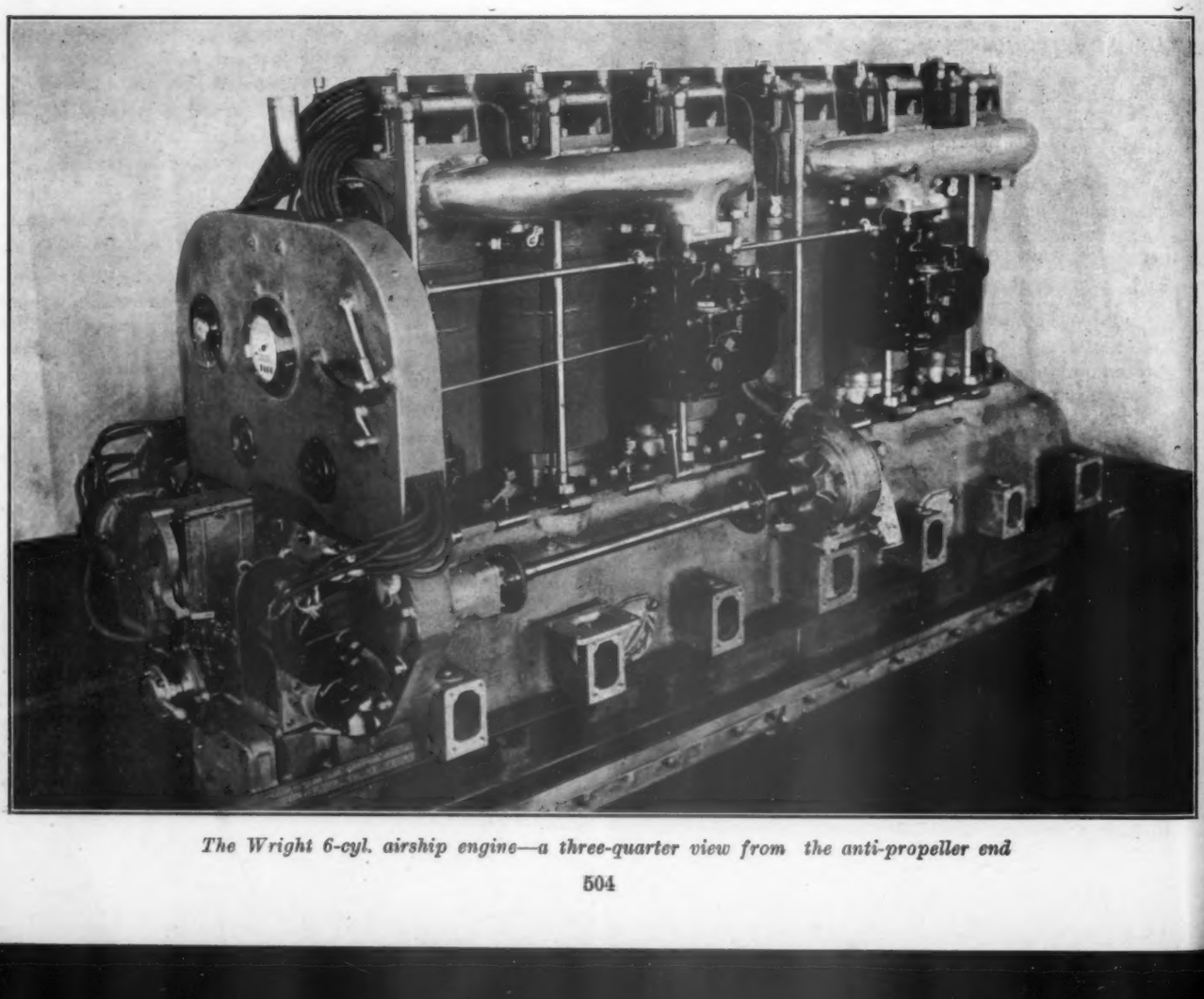
The 50-hr. test referred to called for the running of the engine at b.hp. of 350 for 40 hr. at 1350 r.p.m. and for 10 hr. at 400 hp. at a speed of 1400 r.p.m. These figures of power maintained during the actual test.

The engine finished its 50-hr. test in a condition which the Wright company feels is extraordinarily satisfactory. Defects of only the most minor nature were discovered in the engine after disassembly. The main bearings, gears, pistons and rings and valves were in perfect shape and would have run three or four times as long without attention.

Chief Requirements

The design of this engine was carried out with three major requirements in mind: first, reliability; second, accessibility; third, economy. Reliability was striven for as the engine was required to be one which would be capable of running 100 hr. continuously at wide-open throttle and this called for exceedingly rugged construction. Accessibility was called for as all but the absolutely major overhauls should be possible in the airship car. Economy was sought for along the lines of building an engine which would be capable of running 100 hr. with wide open throttle and would have a minimum weight of engine plus jacket water plus gasoline and oil for 100 hr. at full throttle. The engine weight, as such, becomes of much less importance under the circumstances if the increase in weight results in a marked decrease in fuel consumption.

In general, the design of the engine is very simple. The cylinders are of the individual type, four valves to the cyl-



The Wright 6-cyl. airship engine—a three-quarter view from the anti-propeller end

inder. The push rods for each cylinder are actuated by camshafts in the crankcase. This construction simplifies the removal of the single cylinder for repairs as repairs can thus be made without spoiling the timing. The two carburetors, each with manifolds for three cylinders, further simplify the overhaul. The crankcase is of the self contained type considerably used in marine work, the crankshaft being held in place by bearing caps instead of being contained by the halves of the case itself. This results in the use of an underpan which acts simply as an oil retainer and at the same time makes possible an exceedingly rugged crankcase construction. The oil pumps, oil filter screen, and oil pressure relief valves are all on the rear end of the engine as are the magnetos with their advances and the booster. On the side well above the engine bed are the two carburetors and the water pump, together with the engine speed governor and the corresponding oil pressure governor. Therefore, for any repair work except an absolute disassembly, the engine can be handled with out removing it from the gondola.

The controls of the engine are all placed on the small panel at the rear end so that a mechanic could look after the engine completely without having to move around at all. The cylinder construction is somewhat on the lines of the well-known Maybach engine used on Zeppelin airships having four valves seating in a cast-iron head, steel barrels screwing into this head, having a sheet steel jacket surrounding it. The pistons are of aluminum, of conventional construction and as light as is possible to make them to give adequate heat flow. The piston pins are floating and the connecting rods are of the conventional tubular type.

To give an idea of the size of the engine the crankshaft is between 5 ft. and 6 ft. long and has a bearing diameter of 3 in.

While this engine is not yet fully developed, the evidence so far would strongly suggest that it will be a valuable factor not only in the development of lighter-than-air engines, but in a development of knowledge of engines for commercial plane use.

Starting Aircraft Engines at Low Temperatures

The work carried out by Professor Robb at Edmonton, Alberta, during this season and last is summarized in the form of a procedure for starting aero engines at various low temperatures, in Technical Memorandum No. 29, Canadian Air Board.

The problem as presented to Professor Robb was that he was to assume that the engine was in an airplane which was forced to spend a night in the open away from the base, and it was decided to know the best method that the crew should adopt in order to start the engine the following day. It is assumed that while the engine has been still hot, the cooling system has been completely drained or that an efficient anti-freeze mixture is available. It is also assumed that the battery has been removed from the machine and kept at ordinary room temperature, and also that a supply of commercial ether at room temperature is available.

The first operation is to ease up the engine by doping with about one-half pint of gasoline and turning the engine over until it is quite free. In this connection it is important to see that there is no ice in the water pump before any attempt is made to turn the engine over. The next operation is to dope the engine with about one-quarter of a pint of a mixture of ether and gasoline. The mixture which is most suitable to different temperatures is given in a list below. It is important that this initial doping should not be too liberal as it has been found that if the doping is slightly increased the engine does not start well. As soon as the engine starts to fire an additional one-quarter of a pint of the mixture is pumped into the intake manifolds, and this should suffice for the engine to begin to fire on gasoline from the carburetor which has been flooded meanwhile.

The engine is allowed to run for about two minutes until it is warm enough to take water at ordinary room temperatures, but care must be taken that the engine is not run too long without water. As soon as the cooling system has been filled the engine should be started again and run for some little time to see that the cooling system is functioning properly.

If the engine starts to boil in an unduly short time examination should be made for an accumulation of ice that may have stopped the system.

Experiments will be carried out on the best method for handling the oiling system, but at present it is considered advisable to drain the engine immediately on landing and fill it up with oil at at least room temperature when commencing to start. It is essential that the battery should be charged to specific gravity of over 1.25, and this suggests an extra battery should be carried. (The experiments were carried out on a Liberty engine. If the engine is fitted with magnetos care should be taken to see that the contact points and the distributor are clean and in good orders before attempting to start.)

The priming nozzles serving the intake manifolds must be sufficiently large to permit liberal doping quickly, and in the case of a second cold start being required soon after the first, care should be taken to see that these nozzles have not become frozen-up. The priming device requires to have sufficient capacity to permit quick doping with ether mixture and the storage tank to serve the priming pump should have capacity for at least one-half pint of mixture to permit two dopings.

Professor Robb used a pump constructed from a grease gun which had a bore of 1⅛ in. and a stroke of 7 in., and he states that a standard priming pump is too slow for this particular service. Professor Robb experienced no difficulty with the spark plugs in almost 100 starts, but it is considered advisable to remove the plugs from the engine and heat them over a fire before attempting to start.

The proportions of the mixture for doping, suitable for different temperatures is as follows:

DOPING MIXTURES FOR STARTING AIRCRAFT ENGINES

Temperature.	*Gasoline.* Pure.		*Ether.*
+20 deg. F. and above			
Zero to 20 deg. F.	3	to	1
—15 deg. F. to Zero.	2	to	1
—30 deg. F. to —15 deg. F.	1	to	1
—37 deg. F.			Pure (Warm)

At the higher temperatures it has not been necessary to warm the mixture, but a start at —37 deg. F. indicates that at this temperature ether requires to be warm, that is, at room temperature. The carburetor should be flooded in all cases before starting, and the spark should be advanced immediately the engine begins to fire. The usual position of the throttle for starting the Liberty engine is about one-fifth open.

Aeronautical Institute Suggested

The Aeronautical Chamber of Commerce has received suggestions from a number of its members that it provide for the organization of an aeronautical institute.

The first suggestion implied that the program of an aeronautical institute be limited to questions of engineering and design. Consequently, a questionnaire was sent to the engineering members of the Ae. C. of C., and to this questionnaire replies are now being received.

It is believed that it would be best not to limit the plan and scope of an aeronautical institute to design and engineering but to have the program include a conference covering (1) Discussion of questions and tendencies of engineering and design; (2) Discussion of questions of operation and navigation; (3) Discussion of questions of aerial law; (4) Discussion of questions of finance and accounting problems for manufacturers and operators of aircraft.

In addition to the field covered by the above suggestions, there may be other matters that should be included.

Seaplane Facilities on the Atlantic Coast

Thirty-nine Landing Places for Seaplanes Listed In Survey Issued by National Advisory Committee

Thirty-nine airports suitable as landing places for seaplanes have been definitely located along the Atlantic Coast between New Jersey and Florida in an aerial survey just published by the National Advisory Committee for Aeronautics.

The first leg of a 9000-mile air cruise extending down the Atlantic Coast, along the Gulf, up the Mississippi and around the Great Lakes, has just been completed by Ewing Easter, of Baltimore, who made the trip in Curtiss Type F flying boat. The lists of airports carries information of value to seaplane pilots contemplating a cruise along the coast, and gives detailed data as to anchorage, beach landings, tide, current, oil, gasoline and aviation supplies.

Summary of Landing Places

The North Carolina coast offers the greatest number of suitable aerial ports, having fourteen such landing sites. Maryland has ten good coastal stations, Florida six, South Carolina four, New Jersey two, Georgia two and Delaware one.

In New Jersey, the report of the N.A.C.A. states, excellent landing facilities for all seaplanes are available at Keyport, where deep water moorings, beaching, repairs, and supplies are available. An emergency landing for small aircraft is also found in Deal Lake near Asbury Park.

Newcastle, Del., affords a landing place for all types of seaplanes, though no protected anchorage nor beach is to be found. Gas and oil are available, but not supplies.

In Maryland three excellent landing places for all seaplanes are Annapolis, Baltimore and Ocean City. In Baltimore, protected anchorage, gas, oil and supplies are to be had at the Easter Airlines shops under Hanover Street Bridge, south of the upper harbor. Good landing points for seaplanes are also located at Cambridge, Chestertown, Cape Charles, Crisfield, Easton and Oxford, while Salisbury offers a one-way landing and take-off port for small aircraft on the narrow Wicomico River. Gas and oil are available at all these ports.

Along the coast of North Carolina there are excellent airports at Morehead City and Southport, and good landing places at Columbia, Bell Haven, Edenton, Elizabeth City, Hertford, New Bern, Oriental, and Swann Quarter, with gas and oil available. At Plymouth on Albermarle Sound, a landing is available only for small craft on account of the narrowness of the river. At Washington, N. C., the report states, large craft should land about a mile from the city, east of the railway bridge, although small craft can land in front of the city above the bridges. Wrightsville Beach furnishes the nearest landing for Wilmington, in the sound north of the bridge. Facilities at Morehead City are said to be much better for seaplanes bound for Beaufort, N. C., than in the neighborhood of Beaufort.

South Carolina has four good seaplane ports: Beaufort, Charleston, Parris Island and Georgetown. Data for Parris Island and Charleston are already marked on flying maps, but details of Beaufort and Georgetown facilities are given in the report.

Brunswick, Ga., offers good landing for all seaplanes and protected anchorage in front of abandoned naval air station. Savannah has only a one-way landing and take-off. Darien, Ga., and the St. John's River, south of Lake George, offer no good landing places.

St. Augustine, Fla., affords an excellent landing place for all seaplanes. Other good landing points in Florida are located at Fernandina and Green Cove Springs, while small craft, it is stated, can land safely in Lake Breesford, three miles from De Land, also at Sanford on St. John's River. and Palatka. Large craft can also land at Palatka north of railroad bridge or south of the State road bridge.

Having completed the first leg of his cruise, Mr. Easter is now enroute in his flying boat up the west coast of Florida, from where he will follow coast line of the Gulf of Mexico for a complete survey of air harbors.

Following is the full information collected by Mr. Easter on landing places for seaplanes along the Atlantic Coast.

New Jersey

Asbury Park—Emergency landing for small craft only in Deal Lake. Deal is an artificial lake about a mile long and about 130 yd. wide. Several bridges and telephone wires make landing and take-off dangerous. Protected anchorage anywhere. Gas and oil available. No aviation supplies. No beach. No tide. No current.

Keyport—Excellent landing for all seaplanes. Moorings in deep water furnished by Aeromarine Plane & Motor Corp., who have large factory there. Repairs and supplies available. High test gas and oil at factory. Three to four foot tide. Beaching facilities.

Delaware

New Castle—Landing for all seaplanes. No protected anchorage. No beach. Swift current around wharves. Gas and oil available. No aviation supplies. Tide 5 to 7 ft.

Maryland

Annapolis—Excellent landing for all seaplanes. Good sand bottom and beaching facilities at north end of state road bridge. Annapolis one mile from this point. Weather reports available at Naval Academy. Gas and oil available. No aviation supplies. One foot tide. No current.

Baltimore—Excellent landing for all seaplanes at Hanover Street Bridge, which can be seen from the air as large concrete bridge south of upper Baltimore harbor. Protected anchorage furnished by Easter Airlines, whose shop and office are located in arch of bridge. High test gas and oil. Aviation supplies and repairs available. One foot tide. Beaching facilities. No current. Ten minutes from business district by trolley. Weather reports available.

Cambridge—Good landing for all seaplanes. Protected anchorage with firm sand bottom in cove west of steamboat landing. Good beach about one mile west of town. High test gas and oil from Red "C" Oil Co. No aviation supplies. Two foot tide. No current.

Chestertown—Good landing for all seaplanes. Partially protected anchorage with mud bottom near bridge. Beach on opposite shore from town. Gas and oil available. No aviation supplies. No tide. Moderate current.

Crisfield—Good landing for all seaplanes. Protected anchorage in creek west of town, with firm sand bottom. No beaching facilities. Gas and oil at public wharf. No aviation supplies. Two to four foot tide. No current.

Easton—Good landing for all seaplanes. Large craft will land at mouth of Tread Avon River and taxi to steamboat wharf at Easton Point. (One mile from town.) Gas and oil available by truck from town. No aviation supplies. Tide negligible. Moderate current.

Ocean City—Excellent landing for all seaplanes in Sinepuxent Bay. Good anchorage with sand bottom near bridge. Good beach. Gas and oil available. Two foot tide. Strong current at bridge and wharves. No aviation supplies. Weather reports at Coast Guard Station.

Oxford—Good landing for all seaplanes. Good anchorage in firm sand. Beaching facilities. Gas and oil available. No supplies. One to two foot tide. No current.

Salisbury—One-way landing and take-off for small craft only in Wicomico River. Very narrow and twisting. Landings will be made at a point in river two miles soutwest of town and taxi up to public wharf. *No landing for large craft.* Anchorage in soft mud bottom. Gas and oil available. No supplies. No beach. No tide. No current.

Cape Charles—Good landing for all seaplanes. Avoid stakes and keep in steamboat channel when taxiing up to the

wharf. Protected anchorage with sand and shell bottom in cove near steamboat wharf. Gas and oil stations on docks. Three foot tide. No supplies. No beach. No current.

EDITOR'S NOTE—Virginia affords good airports at Langley Field and at Hampton Naval Air Station.

North Carolina

Beaufort—See Morehead City, as landing facilities are much better there.

Columbia—Good landing for all seaplanes in Bull Bay which is three miles from town. In taxiing up Scuppernong River avoid stakes and keep in channel. One-way landing and take-off for small craft in Scuppernong River nearer town. Protected anchorage with soft mud bottom. Gas and oil available. No beach. No supplies. No tide. Moderate current.

Bell Haven—Good landing for all seaplanes. Anchorage for large craft in front of town. Protected anchorage for small craft in creek back of town. Gas and oil available to wharf by truck. No tide. No current. No beach. No supplies. *Avoid submerged reef marked by Wreck East of public wharf.*

Edenton—Good landing for all seaplanes. Protected anchorage with soft mud bottom in creek west of public wharf. Gas and oil available. No beach. Two to three foot wind tide. Moderate current. No supplies.

Elizabeth City—Good landing for all seaplanes. Protected anchorage in harbor, with mud bottom. Gas and oil available at public wharf. No aviation supplies. No tide. No current. No beach.

Hertford—Good landing for all seaplanes. Avoid stakes in landing and taxiing. Protected anchorage with firm sand bottom. Gas and oil available by truck. No supplies. No tide. No current. Good beach.

New Bern—Good landing for all seaplanes. Unprotected anchorage with firm sand and mud bottom. Severe northeast gales frequent between November and April. Gas and oil available at public dock. No supplies. No tide except wind tide. Moderate current. No beach.

Oriental—Good landing for all seaplanes. Protected anchorage, with firm sand bottom. Gas and oil available from garage in town. One to three foot tide. No current. Good beach.

Plymouth—One-way landing and take-off for small craft only. *Not safe for large craft. Dangerous, as river is narrow and bordered with high trees.* (Width of river about 200 ft.) Protected anchorage with soft mud bottom. Gas and oil available. No supplies. No tide. Moderate current. No beach.

Morehead City—Excellent landing for all seaplanes. Unprotected anchorage in front of city. Gas and oil available at gasoline docks. Weather reports and aviation supplies available from Coast Guard Air Station two miles south of town. Also beaching facilities there. Four to five foot-tide. Swift tidal current at wharves.

Southport—Excellent landing for all seaplanes. Unprotected anchorage, rocky bottom. Gas and oil at wharf. Two foot tide. Beach. No supplies.

Swann Quarter—Good landing for all seaplanes in Juniper Bay. Seaplanes will beach at entrance of canal one-half mile from town. Protected anchorage with firm sand bottom. Gas and oil supplies not always available. One to two foot tide. No aviation supplies. Good beach. No current.

Washington—Landings for large craft will be made east of railroad bridge about one mile from city. Landings for small craft can be made in front of city between bridges. In landing here *avoid small stakes.* Gas and oil for large craft by truck from city, for small craft at gasoline docks. Good anchorage, mud bottom. No tide. No beach. No supplies.

Wrightsville Beach—Landing for all seaplanes in sound north of bridge. Take-off along sound to north or through inlet to ocean. Numerous sand bars to be avoided. Unprotected anchorage in sound with sand bottom. No gas and oil except by trolley from Wilmington during winter months. Gas and oil available in summer. Trolley service to Wilmington all year. Two to four foot tide. Swift tidal current. Good beach. No aviation supplies. This is the best point of landing for Wilmington as the river at that point is narrow with submerged stumps and exceedingly swift current.

South Carolina

Beaufort—Landing for all seaplanes. At high tide *avoid submerged reef* and marshland extending about one-quarter mile out from point of land on opposite shore east of town. Moorings available in front of K. of C. wharf. Good anchorage here also with firm sand bottom. Gas and oil station on steamboat wharf. Aviation supplies available and beaching facilities at Marine Air Station, Paris Island. Four to six foot tide. Strong tidal current at wharves.

Georgetown—Good landing for all seaplanes in Winyah Bay and taxi quarter-mile up creek to town. Anchorage at mouth of creek with firm sand bottom. (Do not anchor in creek in front of town as bottom here is smooth rock.) Gas and oil available at wharves. No supplies. Two foot tide. Swift tidal current at wharves. Beach at mouth of creek.

Georgia

Savannah—One-way landing and take-off for all seaplanes. Unprotected anchorage with mud bottom. Gas and oil available. No aviation supplies. Swift current. No beach.

Fairhope unsuitable for landing.

Darien unsuitable for safe landing.

Brunswick—Landing for all seaplanes. Protected anchorage in front of abandoned Naval Air Station. Gas and oil available at public wharves. Tide three to four feet. Strong tidal current at wharves. Beach at Air Station. No supplies.

Florida

Fernandina—Good landing for all seaplanes. Unprotected anchorage near mud flats opposite city. Protected anchorage in creek south of city. Severe northeast gales frequent from November to May. Gas and oil at gasoline docks. No supplies. Six to eight foot tide. Swift tidal current at docks. No beach.

Deland—Landing for small craft only in Lake Breesford which is three miles from town. Protected anchorage anywhere with mud bottom. Gas and oil available at dock. No supplies. No tide. No current. No beach.

NOTE.—The St. Johns River route is unsafe for any but very small craft south of Lake George, as the river is narrow and very twisting.

Green Cove Springs—Good landing for all seaplanes. Protected anchorage on either side of steamboat landing. Gas and oil available from garage by truck to wharf. One to two foot tide. No current. No supplies.

Palatka—Landing and take-off for large craft north of railroad bridge or south of state road bridge. Landing for small craft between bridges for take-off in small bridge taxi through railroad drawbridge and take-off north of same. Gas and oil available for large seaplanes by truck and for small craft at public wharf. No supplies. No beach. No tide. No current.

St. Augustine—Excellent landing for all seaplanes north of bridge. Anchorage with mud bottom anywhere in front of town. Protected anchorage and beach in creek at north end of town. Gas and oil available at Capo's wharf or from garages. No aviation supplies. Three foot tide. Strong tidal current at wharves. Weather reports from Coast Guard Station.

Sanford—At head of St. John's River route for small craft. Excellent landing. Protected anchorage with firm sand bottom near public wharf. Gasoline and oil available from garages. No beach. No tide. No current. No supplies.

NOTE.—I have operated an "F" boat at the points mentioned and this report is based upon notations made at the time.

Latitude and longitude are not given as I have no means of ascertaining this data at hand.

In giving the rise of tide I have not taken the figures for mean neap tide but have given figures which allow for the maximum rise due to wind conditions, which are of more interest to the seaplane pilot.

SVA's Emigrate

Sixteen SVA two-seaters were shipped to Italy by Ansaldo & Co. of New York on the S. S. Verdi on April 13. It is understood that these machines have been purchased by the Italian government.

These machines were part of a shipment of planes originally received from Italy on consignment to the Aero Import Corp., which is now out of business.

Several other SVA two-seaters have recently been sold. It is also reported that one of the Ansaldo six-seater cabin machines is now for sale at a greatly reduced price.

Eliminating Fires in Airplanes

Special Study of the Subject by the Air Service Shows Considerable Progress Made in Past Year

By C. H. Butman

Fires in the air, once the *bête noire* of airplane pilots, have been eliminated in the Air Service during the past year, while the Navy suffered but one such accident, and there were none in the Marine Corps.

A special study of fires in airplanes, just completed by the Air Service, shows that considerable progress has been made in the past year in fire prevention, which is considered of paramount importance, and also in methods of extinguishing fires, the majority of which result from crashes and the consequent bursting of gas tanks.

Number of Accidents Greatly Decreased

In the past year fires in the air in Army planes were eliminated entirely, whereas the year before there were ten such fires. During the year 1920, Army statistics show, there was a total of twenty-eight fires in military planes, eighteen of which occurred on the ground following crashes of planes. Although there was a total of twenty-seven fires in Army planes in the year 1921, they all occurred on the ground and as a consequence efforts are being made to prevent fallen airplanes from becoming gas-soaked and ignited. In this connection, it is believed that the design of crash-proof tanks and other improvements will aid materially in solving the problem, which is admittedly a serious one.

A survey of naval fires in airplanes shows that during the two years following the Armistice there were twenty-nine fires in aircraft, nine of which occurred in the air and seven followed crashes. In 1921 there was but one fire in naval airplanes in the air but the fliers were saved. While no record of fires is kept in the Marine Corps Aviation, there were three fatalities in 1920 from fires in the air, and two in 1921, resulting from a crash.

In the commercial field there were reported seventeen fires in 1920, nine of which occurred in the air, and eight resulted from crashes. In 1922 only four fires were reported in civil heavier-than-air craft, while in the air, and four on the ground.

Air Service engineers in cooperation with naval experts are conducting experiments looking toward the improvement and development of many safety fire appliances, including crash-proof tanks, mechanically operated fuel pumps, fuel system refinements, outside air intakes, drain pipes, fire walls, fire proofing, and fire extinguisher distribution systems.

The Causes of Fire

From a study of airplane fires, their causes and means of prevention, looking toward the lessening of the fire hazard, it appears that after the main cause, ruptured fuel tanks, is eliminated, other causes should be studied; and among the possible causes are the following: ignition of free gasoline or pockets of gasoline vapor by exhaust gases from engines; ignition of collected gasoline as a result of back-fire through the carburetor intake; broken or disconnected ignition wires, static electrical discharges or from defective radio installation.

Fires have occurred after a crash, the report made to Maj. Gen. Mason M. Patrick, Chief of Air Service, states, in airplanes constructed entirely of metal as well as in those treated with fire-proof dope, which indicates that the danger of fires following a crash cannot be eliminated by constructing the airplane of non-inflammable or fire-proof material. It is the fuel which starts burning rather than the material of which the plane is constructed, but the destruction of the airplane may follow, the report points out.

Accident reports received by the Air Service indicate that in nearly all cases where a plane caught fire following a crash, the engine was running at the time of the crash. In such accidents, it is stated, the rupture of the gasoline feed system and the tanks themselves, while parts of the engine are still extremely hot, is likely to cause fire. The possibility of gasoline coming into contact with exhaust gases or hot parts of the engine is greatly increased when gas tanks are located above the engine or directly behind it. When an air-pressure feed system is used, the gasoline in the tank is under pressure, and a rupture of the tank causes the discharge of this highly inflammable vapor and liquid, throwing it over the hot engine and its adjacent parts, thus increasing the likelihood of fire. Free gasoline might also be ignited by sparks from the broken battery ignition system.

As preventative methods against this sort of fire hazard, the report states, there is suggested the use of a mechanical gasoline feed system, instead of the pressure system; a different location of fuel tanks; the placing of fire-proof bulkheads between the fuel tanks and engines, and the use of detachable tanks. Experiments toward the production of rupture-proof tanks indicate the possibility of preventing the flooding of the engine by gasoline as a result of a crash. In many cases it has been reported that the airplane was quickly soaked with gas and consumed by fire in a very short time, usually before the ambulance men or bystanders could reach the victims.

Fire Extinguishing Mixtures

As a safety precaution, one method suggests the placing of a tank of tetrachloride, or some similar fire extinguishing mixture, in such a position as to cause it to discharge its contents over the engine in the event of a crash before the gasoline from the tank can become ignited.

In the majority of fires taking place while the plane is in flight, the report states, the cause is attributable to back-fire through the carburetor intake, igniting gasoline or vapor which has collected around the carburetor as a result of leaks in the fuel system. Improvements in the pipes connecting the carburetor with the gasoline tanks have limited this danger to a great extent. The intake to the carburetor also has been placed outside the fuselage so that the flame of back-fire cannot come into contact with gasoline or vapor.

Fires resulting from defective exhaust manifolds, have been eliminated by better designed manifolds which lead the exhaust away from gasoline and vapor. Ignition leads are now well armored and anchored to prevent possible breaks or loosening. While no fires have been reported from static discharges and only one from radio equipment, precautions are taken to prevent these possible causes by grounded interior wiring systems and bonding all aircraft for radio.

The success of the above measures is shown by the fact that but one fire occurred in Army and Naval planes in the air last year as compared to several such fires during the previous year. The Liberty engines in 1921 were all equipped with outside air intakes (carburetor stacks) with the result that not a single fire occurred in these planes in the air, although some commercial planes not so equipped were burned.

Various devices designed for extinguishing fires during flight have also been tested and installed. Fire extinguishers have been so placed that a stream can be directed from the pilot's seat to the vicinity of the carburetor. Sprinkling systems using tetrachloride have been tested with success. In some cases the pilots of burning planes have extinguished the fires themselves by shutting off the gasoline supply and side-slipping the plane. Fire walls have also been constructed to prevent the spread to the pilot's cockpit.

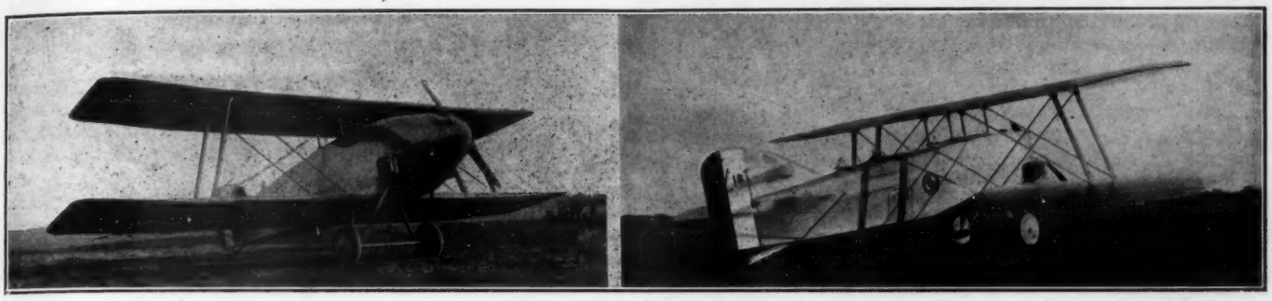
Engineers are agreed, however, that the primary line of endeavor is to prevent fires from breaking out, but extinguishing methods are also being thoroughly investigated and used wherever they do not sacrifice the vital characteristics of the plane itself.

The Wibault Night Bombing Biplane

French Two-Seater Fitted with 600 hp. Renault Engine Has Useful Load to Total Weight Ratio of 52 per cent

By John Jay Ide

Michel Wibault, who was formerly associated with the Borel Company, has recently built for the French army air service a large biplane for night bombing. This is undoubtedly one of the most interesting of the French military airplanes recently built. Although it is a large machine of over 55 ft. span it is proportioned like a pursuit single-seater. The wings are frankly inspired by German practice being of the thick high-lift type. The lower surface has no camber, having in fact the appearance of being slightly convex. A peculiarity of the design is that the thickness of the wings is reduced toward the tips by inclining the lower surface upward.



Two views of the Wibault night bomber (600 hp. Renault engine) which recently passed the acceptance tests of the French army air service

Wings

The framework of the wings is of duralumin. The longerons are of the box type, with thick top and bottom flanges connected by vertical and diagonal plates with lightening holes. The ribs are of duralumin tubes, the diagonal braces being flattened out at their extremities and riveted with duralumin rivets. The wings of the Wibault although weighing only 1.2 lb. per sq. ft. have successfully withstood a load of 48,400 lb. of sand without deformation after removal of the load. This represents a load factor of 7.5.

Ailerons are fitted to the lower plane only which has somewhat greater span than the upper plane. The single pair of interplane struts on each side of the fuselage is inclined inward toward the top. There are also two pairs of short vertical center section struts running from the fuselage to the upper plane.

Fuselage

The fuselage, which is 4.2 ft. wide and 5.9 ft. high at its maximum cross section, is composed of four duralumin tube longerons and steel tube struts. The junction of the longerons and struts and the fastenings of the diagonal wire bracing are effected by sheet metal fittings. The forward part of the fuselage is covered with aluminum sheet and the rear part by fabric.

The engine is a 600 hp. Renault with 12 cylinders of 160 x 175 mm. bore and stroke. Cooling is effected by two Lamblin radiators of elliptical section, one radiator placed on each side of the fuselage. Starting is by an electric motor. The engine also drives a generator for the navigation and landing lights, heating of the personnel, etc. The fuel tanks contain 154 gal.

The pilot's cockpit is further aft than usual, being about half way between the wings and the tail. His seat is to the left of the longitudinal axis, the gunner being ordinarily seated below and to the right of the pilot. When in action, however, the gunner takes his position in a cockpit directly behind the pilot's seat. The gunner can fire downward through a trap in the floor of the fuselage. The bomb gear is placed below the fuselage under the center of gravity.

The tail unit is made up of duralumin tubes of the same section as is used for the wings.

Landing Gear

The landing gear consists of two wheels and an axle supported by struts forming two V's. The forward struts are of streamline duralumin tubes and the rear ones of steel tubes. A combination steel and wood skid protects the tail.

It will be noted from the characteristics given below that the ratio of useful load to total weight attains the remarkable figure of 52 per cent. This figure has seldom been reached with wood construction, and its attainment in using metal construction is a high tribute to the design.

Characteristics

The characteristics of the Wibault 2 Bn2 are:

Span (upper)	50.2 ft.
Span (lower)	55.4 ft.
Gap	9.7 ft.
Chord	9.8 ft.
Wing area	1076 sq. ft.
Weight, empty	4752 lb.
Useful load	5158 lb.
Total weight	9900 lb.
Wing loading	9.2 lb./sq. ft.
Power loading	16.5 lb./hp.
Speed at 6560 ft.	124 m.p.h.
Ceiling	16,400 ft.

Drag of C Class Airship Hull

N.A.C.A. Report No. 138

This report, by A. F. Zahm, R. H. Smith and G. C. Hill, shows that a model of the C class airship hull, when severed at its major section and provided with a cylindric mid-body of variable length, had its air resistance increased about in proportion to the length of the mid-body up to three diameters, and in about the manner to be expected from the increase of skin friction on this variable length. For greater length the drag increased less and less rapidly.

As usual for such models, the drag for any fixed length, at 20 to 60 m.p.h., is accurately of the parabolic form $R \alpha V^n$, and hence the drag coefficient is of the hyperbolic form $C \alpha V^{n-2}$, where n is slightly less than 2.

The variation of C with length is stated in the conclusion.

A Theory and its Proof

By G. A. Spratt

The following article which raises some interesting points with regard to airplane stability is published chiefly in view of its bearing on the design of gliding and soaring aircraft as well as of small low powered sport airplanes.—EDITOR.

Early in the development period of the airplane the surface of circularly arched curvature was found to be 'tricky' and 'unsafe.' The distance of the travel of the center of pressure and its peculiar manner of reversal was accepted as the cause and the parabolic curvature was universally used, for upon it the shifting of the pressure center was found to be much less.

Control was, and yet is, obtained by placing tail vanes, of a calculated size and distance from the wing, so that the pressure upon the upper or lower side of this vane, at a certain speed, counterbalances this shifting forward or backward of the pressure center. A failure of this predetermined speed deprives the airplane of a source of control, from which a dive results. This defect attends none of nature's creatures, it can be avoided and its avoidance is found in the manner of employing the once condemned circularly arched single webbed surface.

To illustrate, let the frictionless pressures upon a circularly arched surface, *S*, Fig. 1, be considered.

From all points upon *S* the frictionless pressures, in that they are normal to the surface, are coincident in direction with the radii. From all points they are directed through the

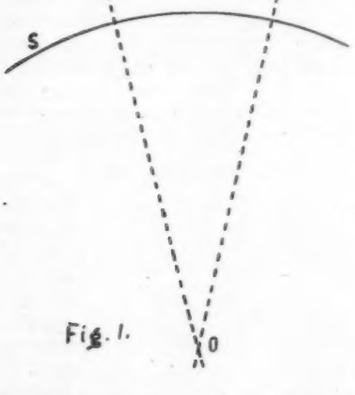


Fig. 1.

common center of the radii. Their resultant force passes through the common center of the radii. It does so irrespective of which radius it coincides with, or what its value may be, therefore does so regardless of the angle of the attacking current, its velocity, or its distribution.

Let the line *AO* represent the resultant force of the pressure upon *S*. An equal contrary force applied at the point of intersection of *AO* and *S*, that is, the center of pressure, will establish equilibrium. There is no torque around this point. An equal contrary force applied at any point along this line *AO* establishes equilibrium. There is no torque around any such point. If the angle of the attacking current changes and the line of the resultant pressure takes the position *BO*, the same is true—an equal contrary force applied at any point along *BO* establishes equilibrium, and there is no torque around any such point. The point *O* is common to both these lines, and it is common to all possible resultants. It is, therefore, impossible for the frictionless pressures upon *S* to give rise to torque around the point *O* whatever may be the angle of attack, the velocity, or the distribution of the pressures, for these factors determine only the value of the pressures, and the radius with which the resultant coincides.

The mass center of a free body is its fixed point. If the mass center coincides with *O*, when free in the air, no frictionless pressure against *S* can alter its angle with the horizon, for no torque can arise.

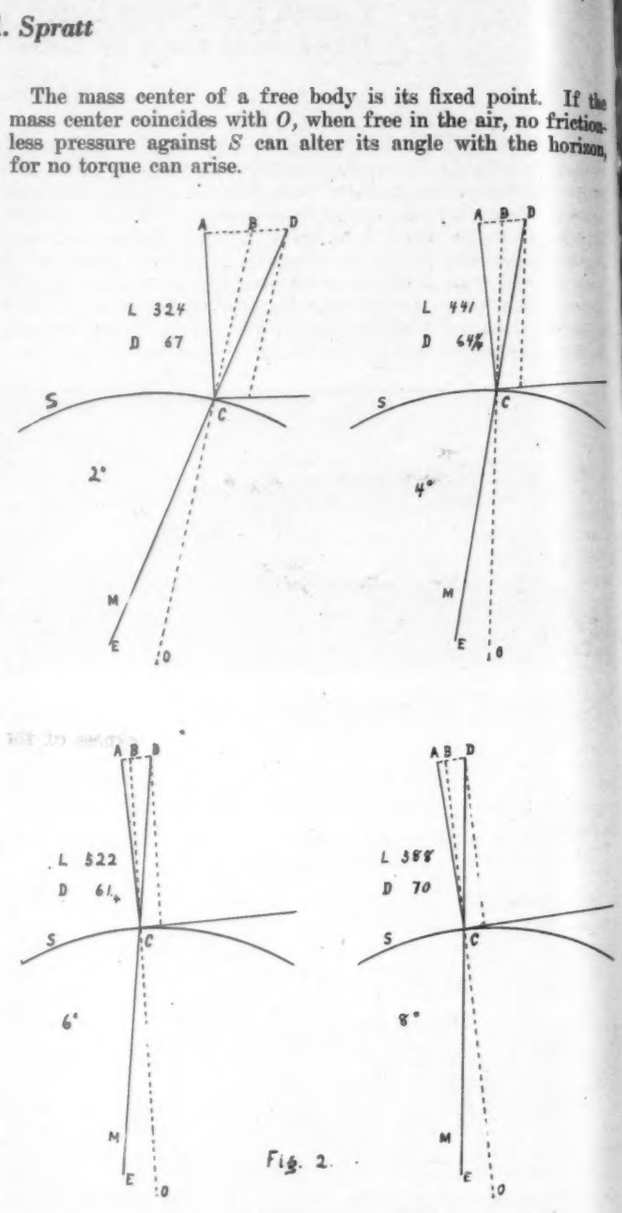


Fig. 2.

In the diagrams of Fig. 2 the effect of drift is shown. The surface *S* is a circular arc 1 - 7. The lift and drift is calculated for an area of 200 sq. ft., and a speed of 30 m.p.h., for 2, 4, 6, and 8 deg. angle of attack. (Loening's "Military Airplanes," p. 68).

In the first diagram, that of an attacking angle of 2 deg., the center of pressure as given in the chart is at *C*. The line *OB*, drawn from the common center of the radii, *O*, through the center of pressure, *C*, shows the position, and the direction, of the resultant pressure force, considered as frictionless. The arrow shows the direction of the attacking current, which is also the direction of the drift. As in the chart, the lift, *CA*, is taken perpendicular to the drift line. The scale of the lift and drift forces is laid out upon these lines. The resultant force of the frictionless pressures coincides with *OB*, (normal to *S*), not with *CA* (as given in the chart). *CB* is, therefore, used in forming the parallelogram, and *DCE* is the resultant of the lift and drift forces.

It will be noticed by comparing the diagrams that the separate values of the lift, and the drift, and the travel of the

center of pressure, combine in a very peculiar manner to cause this line, *DCE*, in each diagram, to pass through a point, *M*, which in each diagram occupies the same position relatively to the surface and its centre, *O*.

Plots of these forces for 10, 12, 14 and 16 deg. show that the line *DCE* passes forward of the point, *M* a further distance in each, as the angle of attack increases. It reverses, however, for at 90 deg. the lift and drift combine and coincide with the bisecting radius, it then passes to the rearward of the point *M*. This is to say:—In a dead stall, this structure, (mass centering at *M*, with surface *S*)*, assumes, and maintains a gliding angle that cannot amount to a dive; the propeller thrust line remains substantially horizontal, and the surface develops its maximum power of resistance to oppose descent.

Actual experiment gives better results than the diagrams indicate. A wind against the surface *S*, when mounted pivotally with *M* as an axis of rotation, fails to cause rotation throughout many degrees of both positive and negative angles of attack.

Laboratory tests, models, and glider tests were all so promising that a motor driven test was made, and the results were all that could be hoped for. The weight was made to center at *M*, and the propeller thrust was made to pass through this point. The surface member was mounted above in a manner that permitted rocking it about its own independent center of mass. In this way the line *DCE* could be made to pass in front, or to the rear, of the point *M* at the will of the operator, and so cause the whole to rotate to an angle of climb or descent. A tail vane was placed to the rear of the point *M*. Success inspired such confidence that a test was made with the tail vane removed, and a quite satisfactory response to control was obtained. The stabilizing effect of the tail vane is desirable, and here again, as with the birds, the tail is not essential to controlled flight. The method of steering to right or left is not within the scope of this writing, but in no way influenced the forces as here described. (*)

There are other advantages in this type of structure beside the elimination of the nose-dive. It opens possibilities of soaring.

The circularly arched surface develops a greater lift than will any other curvature. It will, with chord horizontal, advance against a current having a less uptrend than will any other. In the diagram it may be noticed that at 8 deg. uptrend, the direction of the resultant force *DCE* is about one half degree rearward of the line of gravity. If this same angle of attack is taken in an uptrend of 9 deg., the direction of *DCE* would be one half degree forward, and to that extent represent a propelling force. These figures are illustrative only, this matter has not been subjected to test except in laboratory apparatus and in models.

From the viewpoint of construction, the low position of the mass center permits of suspension taking the place of trussing, in meeting the stresses, to such an extent that this machine can be built much lighter than the present type. One square foot to the pound, with operator included, can easily be obtained. The low position of the weight center does not give rise to a 'pendulum effect,' as would be the case with any other surface curvature.

Taking these points together it seems quite within the bounds of possibility to leave a hillside and find support and propulsion so long as uptends are available—a possibility that does not exist with the present type of airplane to any practical amount.

This theory, at first advanced to give explanation for the "peculiar" action of small test surfaces and phenomena observed elsewhere, grew with the work of exploiting it. From this work, it seems that there is here, quite within reach, a one man airplane weighing perhaps less than 500 lb.; easily handled upon the ground; of slow take-off and landing speed; simple in structure, simple and positive in control; safe for low flying, and practical for sport or travel.

* Patents have been obtained.

Properties of Metals and Alloys at Low Temperatures

At the meeting of the French Academy of Sciences on Feb. 6, M. Henry Le Chatelier presented a note from MM. Leon Guillet and Jean Cournot on this subject, which is as follows:

We have made a number of tests with the view of determining the influence of low temperatures on the hardness and resilience of certain metallurgical products. The temperatures were: +20 deg. Cent. (average atmospheric temperature); —20 deg. (ice and calcium chloride); —80 deg. (carbonic snow); —190 deg. (liquid air).

The test pieces were maintained at the temperature for 15 hr. before the test was made. The results are shown in the table given herewith. These results lead to the following conclusions:

A general increase of hardness is the result of cooling, which corroborates the conclusions arrived at by Robin, published in *La Revue de Metallurgie* (mémoires), 1909, p. 162.

Fragility at low temperatures is a characteristic of ferrite, the fall of resilience in function of the temperature varying directly with the proportion of ferrite. Nickel and copper, on the contrary, do not induce fragility; aluminum, in large proportion, seems even to produce a slight augmentation of resilience.

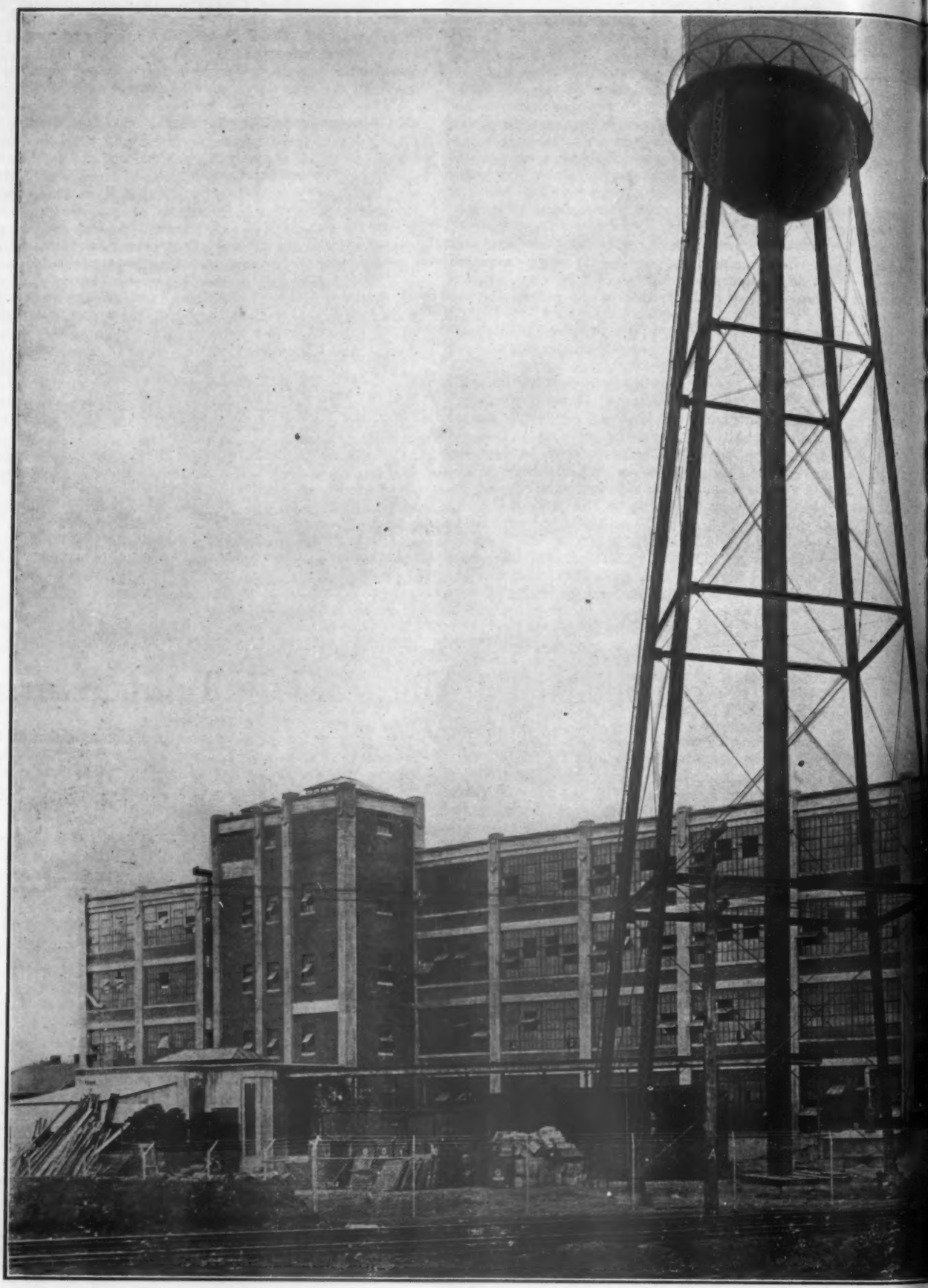
Austenite sufficiently rich in nickel does not induce fragility at low temperatures.* The special perlitic nickel steels are very fragile in liquid air. It is to be remarked, however, that additions of nickel retard the lowering of the fragility with the temperature.

Hardness and resilience tests after a sojourn of 16 hr. in liquid air, show a complete return to normal properties, after twenty-four hours in average temperatures.

* This result is confirmed by the tests, not yet published, made by Chevenard in 1912, relative to the use of ferronickels in appliances used in the manufacture of liquid air.

TABLE SHOWING MECHANICAL PROPERTIES OF METALS AND ALLOYS AT LOW TEMPERATURES

Metals and Alloys	*Hardness—Brinnell Test*				*Resilience*			
	+20°	—20°	—80°	—190°	+20°	—20°	—80°	—190°
Electrolytic iron, annealed	80	77	77	269	21.2	17.5	2.5	1.9
Soft steel (C 0.1), annealed,	110	107	114	273	31.9	32.5	22.5	1.8
Semi hard steel (C 0.33), annealed,	176	174	190	286	13.1	11.2	10.0	3.7
Hard steel (C 0.79), annealed,	230	230	231	330	14.4	11.2	10.0	3.7
Nickel steel (C 0.06, Ni 2.3) annealed,	130	132	135	230	31.2	31.2	23.1	3.1
Nickel-chromium steel (C 0.25, Ni 4.25, Cr 1.2) air tempered,	460	466	444	578	11.2	10.0	11.2	10.0
Nickel-chromium steel (C 0.11, Ni 5.74, Cr 1.74) untempered,	261	289	282	388	11.8	7.5	3.1	1.9
Ferronickel (Ni 36.8 per cent)	157	171	282	239	41.2	36.2	3.1	17.5
" (Ni 47 per cent)	184	192	282	238	32.5	29.4	3.1	29.4
" (Ni 57.4 per cent)	197	212	282	240	26.2	35.0	3.1	31.8
" (Ni 98.8 per cent)	98	103	282	120	47.5	46.2	3.1	40.6
Cobalt,	174	103	282	220	47.5	46.2	3.1	40.6
Pure Copper (99.9 per cent)	51	52	53	66	20.6	18.7	20.6	20.1
Brass (Cu 60.4, Zn 39.3, Pb 0.2)	76	76	76	98	16.2	16.2	17.5	16.8
Brass (Cu 52, Ni 4, Pb 1.3) annealed,	118	114	118	148	8.1	7.5	8.8	6.9
Pure aluminum (Si 0.25, Fe 0.6)	24	25	24	53	11.2	10.6	11.2	13.1
Duralumin (Cu 3.6, Fe 0.6, Mn 0.5, Si 0.6, Mg 0.5)	101	96	101	129	5.0	5.6	5.0	5.6
Aluminum-zinc alloy (15 per cent Zn)	55	47	48	76	11.2	11.2	10.0	9.3
" " (30 per cent Zn)	129	137	121	192	2.5	2.5	1.9	1.8
Aluminum-zinc-lead alloy (Zn 15 per cent, Pb 1.5 per cent)	55	51	49	83	10.0	10.0	10.0	8.1



WHERE WRIGHT AERONAUTICAL ENGINES ARE MADE

ACREAGE. Approximately 7 acres, located on Main Line of Erie Railroad.

AREA. 90,000 square feet.

DESCRIPTION. Four floors, size 75 ft. by 300 ft. Concrete and steel heavy mill type construction, 250 pounds per square foot loading.

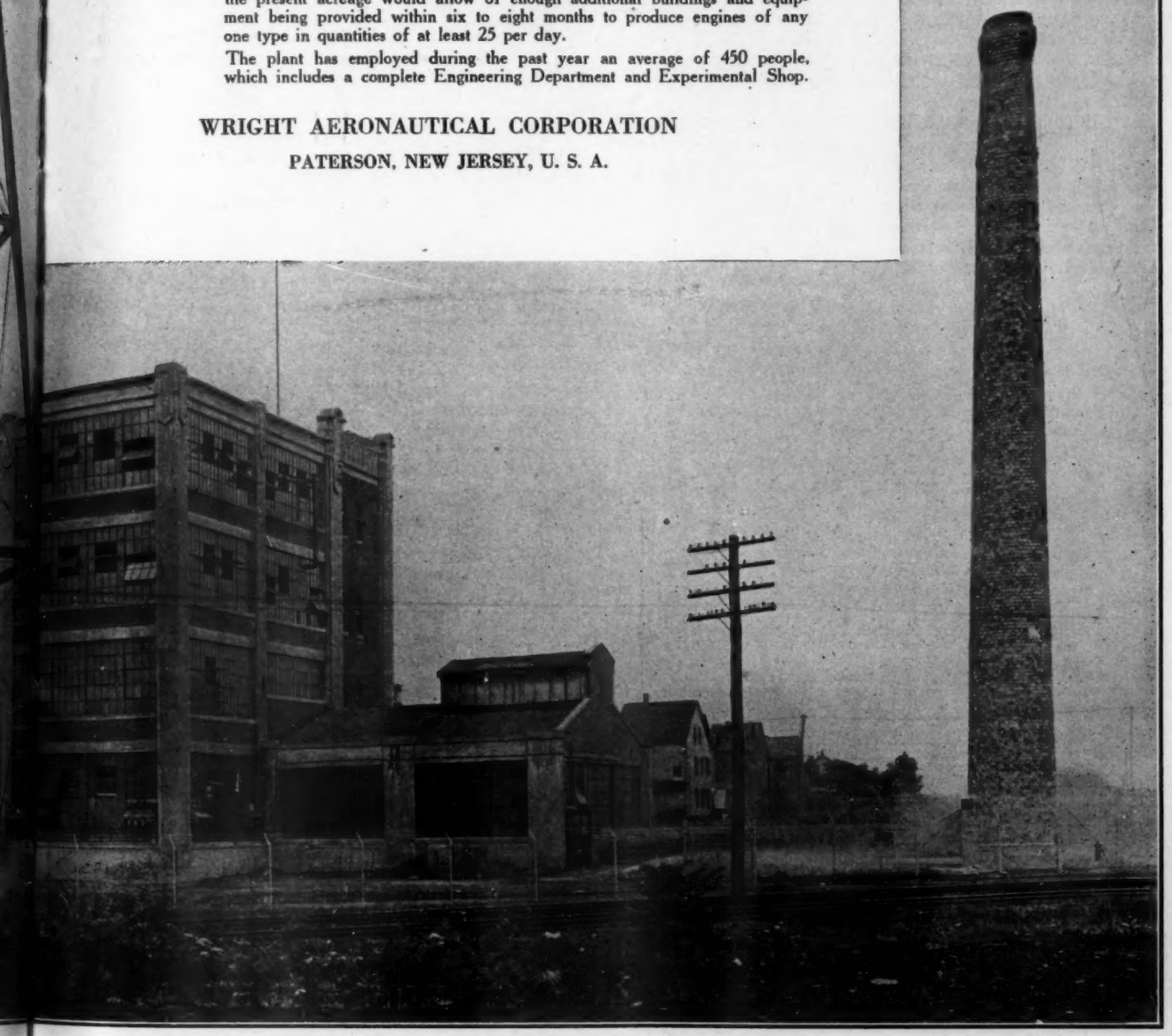
EQUIPMENT. The plant is equipped at present to produce, and is producing, approximately 300 engines per year, with spare parts therefore, and has ample capacity in addition to provide adequately for all spare part requirements for all types of engines previously produced. The equipment of the plant provides for the complete manufacture of various type engines produced, including bronze and aluminum castings, except bar steel and drop forgings.

The capacity of the present plant could be expanded to produce engines at the rate of five per day in the present building. In an emergency the present acreage would allow of enough additional buildings and equipment being provided within six to eight months to produce engines of any one type in quantities of at least 25 per day.

The plant has employed during the past year an average of 450 people, which includes a complete Engineering Department and Experimental Shop.

WRIGHT AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY, U. S. A.



Notices to Aviators

Illinois

Peoria—Landing fields.—The following information concerning landing fields for airplanes and seaplanes at Peoria, Ill., has been received from C. C. Meydam, U. S. N. R. F.:

(*a*) A new landing field, containing about 45 acres, belonging to the Peoria Aircraft Club, has been constructed about 5 miles north of the center of the city, between two railroads, and bordered on the west by a hard concrete road. The field is square, marked with a circle divided into quadrants by two perpendicular lines, and has at the southeastern corner a hangar large enough to house five planes; telephone in hangar. Gas and oil can be secured on short notice. The number of the phone to secure service will be posted in the hangar.

Approximate position: Latitude 40° 45′ N., longitude 89° 36′ W.

(*b*) The field available for landing at the Peoria driving park is small and rough and should be used only as an emergency field.

(*c*) A good landing for seaplanes can be found in the Illinois River behind the Government breakwater, near the baseball park and northward of the ice houses. Service can be secured.

Chicago—Landing Field.—Mr James S. Stephens, consulting engineer, reports that the Aero Club of Illinois has a flying field 1 mile square (640 acres) within the city limits of Chicago, located 10 miles 245° from the post-office building, between Crawford (Fortieth) and Cicero (Forty-eighth) Avenues and Seventy-ninth and Eighty-seventh Streets.

This field has been in operation for eight years and has all equipment for storage, repairs, and supplies, with attendance 24 hr. per day. The field shows a very flat area covered with black loam underlaid by yellow loamy clay. The site is free from trees or shrubbery except along the boundaries; it is higher than the surrounding property and will not receive drainage from adjoining territory.

The club hangars are located in the center of the field, and the public-service hangars are on the western side.

To reach the field by automobile, drive south on Michigan Boulevard to Garfield Boulevard (Fifty-fifth Street), west on Garfield Boulevard to Western Avenue, south on Western Avenue to Sixtieth Street, west on Sixtieth Street to Cicero (Forty-eighth) Avenue, and south on Cicero (Forty-eighth) Avenue, 3 miles to the field.

The Aero Club of Illinois invites everyone to use this field.

—(*N.A. 3, 1922.*)

Flying in Missouri

The Mauldin Aircraft Co. with a field and hangar located one mile east of Fulton, Mo., has succeeded the Henderson-Mauldin Aero Service of Fulton, Mo.

The company is equipped with two Curtiss JN4D machines and at present is doing a general commercial business throughout Missouri, Illinois, Kansas, Oklahoma and Texas. The field is 2600 ft. north and south and 200 ft. east and west, with an excellent grass surface which is high and always dry, and with practically no obstruction from any direction. It is well located in an airline between St. Louis and Kansas City.

The company is well provided with gasoline, oils, tools and a good stock of Curtiss OX5 parts, also a large hangar for storage. Telephone and transportation to town.

Airplane Lumber Company Organized

A company has recently been organized at Hoquiam, Wash., as exclusive manufacturers of high grade Washington airplane spruce, cedar and veneer. The purpose of the organization, known as the Grayport Spruce Co., is to turn out rough and surfaced lumber as well as manufacture complete parts to any specifications.

The organizers are Lewis H. Petersen and John P. Stein. Mr. Petersen, having had practical airplane building experience for a number of years, will have charge of the shop, while Mr. Stein will finance and manage the company.

French Air Traffic Progress

An idea of the astonishing progress of commercial aviation in France during the past year may be gained from a statement issued by the French Department of Aeronautics and Air Transport, giving traffic figures for the years 1919, 1920 and 1921. Considering the handicap under which aviation has been carried on by the companies concerned, the outlook for the future seems very bright. The following is a summary of the official figures:

Year	Journeys made	Miles covered	Passengers carried	Parcels, lb. (approx.)	Letter Mails, lb.
1919	988	158,606	588	14,400	900
1920	2,386	529,454	1,721	110,000	9,000
1921	6,221	1,457,437	10,336	375,000	21,000

The illustrations on the opposite page will give the reader an idea of the activities, types of machines employed and facilities provided at Le Bourget airport (Paris), which leads all others in air traffic.

Figures which are available for the air mail between France and Morocco for 1921 are also very instructive. In the "round" journey there and back, the increases have been very marked. In January, 1921, the total was 16,377 letters; in January, 1922, the number was 50,851, equal to over 300 per cent increase. Curiously, the dispatchings from Morocco to France were greatly in excess, viz: 32,691, as against 18,160 in the reverse direction. So steady has been the growth of the air mail that it has determined the Secretary of State to augment the facilities by increasing the service between Toulouse and Casablanca from three to five times per week as from the month of March, necessitating a fleet of 90 craft. The following monthly figures of letters carried during 1921 speak for themselves: February, 12,025; March, 14,005; April, 17,179; May, 18,878; June, 22,738; July, 28,108; August, 34,283; September, 35,006; October, 40,601; November, 41,330; December, 47,235.

The France to Morocco airway has now been extended to Mogador, the airport of which was inaugurated by the President of French Republic during his recent visit to that city.

It is proposed soon to establish aerial tours from Algiers to the desert at Biskra and Touggourt, and another cross-country line from Gabes and Tunis, in Tunisia, to Algiers; thence to Oran, Algeria, and Casablanca and Agadir, in Morocco.

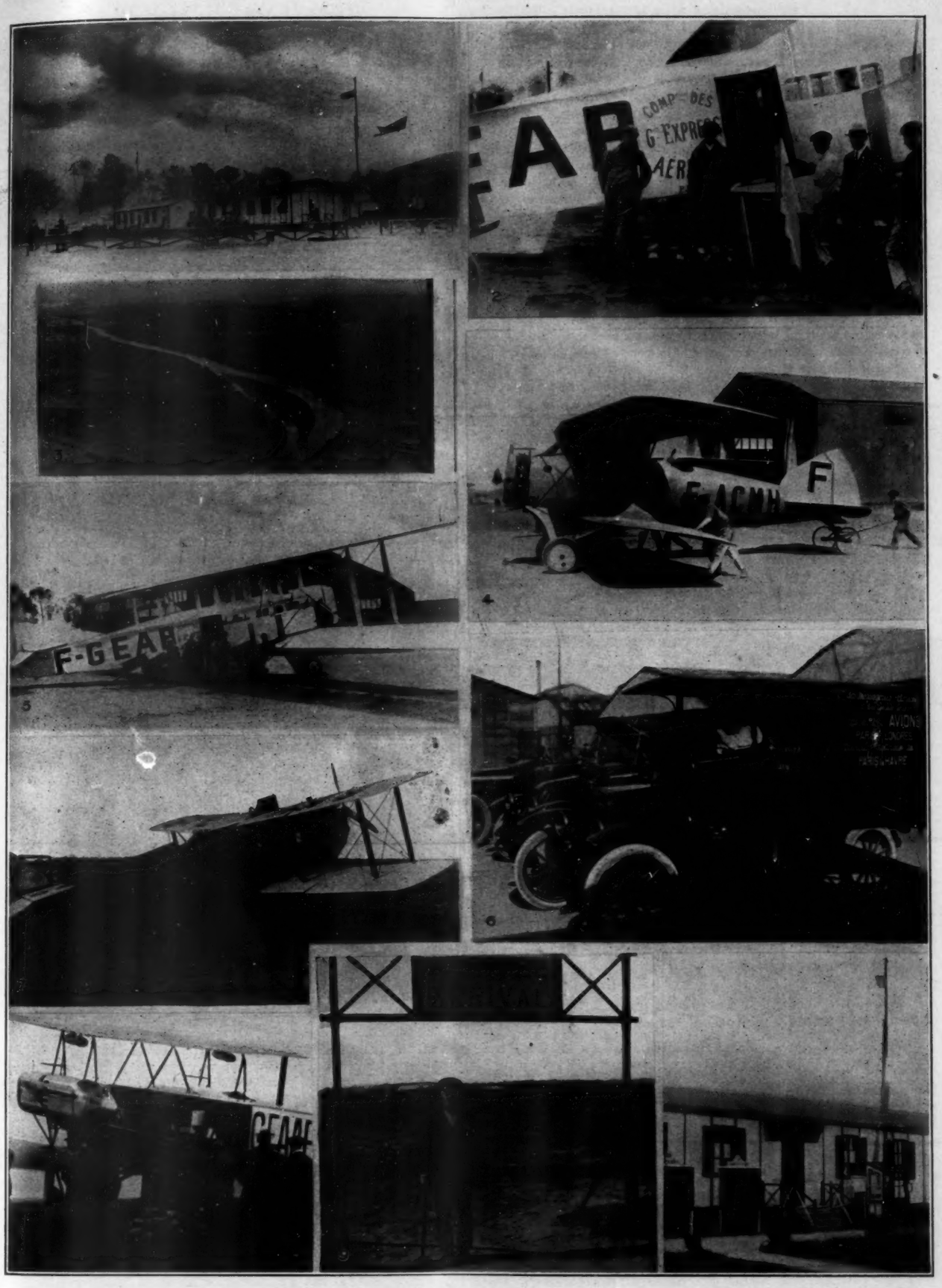
The first pleasure tour by air across French North Africa was recently undertaken by Lucien Sharp, of Providence, R. I., an American citizen, now residing temporarily in Paris. Mr. Sharp came by air from Europe to Casablanca, making the journey from that point to Marrakech, Morocco, thence to Oudida. From the latter point he came directly to Algiers, arriving there Jan. 28. On Jan. 30, he proceeded to the border of the Sahara Desert at Biskra and Touggourt, and intends continuing his journey by air to Constantine, in Algeria, Tunis, thence to Sicily, Rome, Athens, Constantinople and Western Europe.

Loening Gets Army Contract

The Loening Aeronautical Engineering Corp., now located in their new plant at 31st St. & East River, New York, have been awarded a contract by the Army Air Service for ten PW2 (Pursuit-Water Cooled) single-seater monoplanes with Wright 300 hp. engine. The contract price for the ten machines is $127,000 and for spare parts $19,500, a total of $146.500.

Five different models of this same machine were previously constructed by the Loening company for the Engineering Divison, Air Service, at McCook Field, O., and the order for ten PW2's is the result of the experimentation and tests with these models at McCook Field.

By a peculiar ruling of the War Department airplanes have recently been classed as "ships" for bonding purposes. The result in the case of the Loening award is that interest on the $14,000 bond required for performance has been increased from 1 per cent for seven months to 5 per cent, or $732 for the bond. The previous 1 per cent interest on these bonds was allowed when airplanes were classified by the War Department under "supplies."



Paris-Le Bourget airport—Fig. 1. Administration building. Fig. 2. "All on board!" Fig. 3. River Oise on the way to London. Fig. 4. Spad 33. Fig. 5. Farman Goliath. Fig. 6. Baggage cars of the airport. Fig. 7. DH18 air express. Fig. 8. Handley Page air express. Fig. 9. The keeper of the gate. Fig. 10. The air traffic signboards

Meeting of N.A.C.A.

A complete and detailed study of the plans and specifications of the Navy's rigid airship ZR1 was requested of the National Advisory Committee for Aeronautics at its session on April 20 by Rear Admiral Wm. A. Moffett, Chief of the Naval Bureau of Aeronautics. Before the airship, whose parts are now being fabricated, but which has not yet been assemb'ed, is completed, Admiral Moffett is desirous of having a thorough study made of all the stresses and strains it is likely to encounter in the air under service conditions and it is for this reason that he has asked the Committee to appoint a special technical subcommittee of aeronautical experts and engineers to make a special study of its design and structure. While the Navy is confident that its own plans for the airship are correct, it is nevertheless desirous of securing the opinion of an independent committee of experts to avoid the possibility of future adverse criticism. The whole committee approved Admiral Moffett's request and authorized its Chairman, Dr. Walcott to appoint a special technical subcommittee for this purpose.

A Heavy-Oil Engine

Dr. J. S. Ames, Chairman of the Executive Committee, reported on the progress made at the Committee's research laboratory at Langley Field in the development of a new heavy-oil, fuel-injection aircraft engine for the Bureau of Aeronautics, Navy Department. While the details of the development are still held confidential, it is known that its use will greatly reduce the fuel fire hazard in aircraft. This new engine not only does away with the use of gasoline, but also operates without carburetor and spark plugs, thus eliminating certain causes of trouble.

Drawings and performance characteristics of a new high-speed airplane wing, just developed at the Committee's laboratory, Dr. Ames stated, have been turned over to the Army Air Service for use in the design of a new high-speed pursuit type airplane. This new wing is a thick wing section with space for internally bracing the wing and eliminating any wires or struts in the design of the airplane. The wing is both tapered in section and in plane form, conforming somewhat to the general shape of a bird's wing, that is tapering toward the tip, both of which features add materially to the speed characteristics of the wing.

New Instruments

Dr. Ames also explained the operation and application of three new recording instruments recently developed at the Committee's laboratory for studying the performance not only of the airplane itself in flight, but the actual conduct of the operator. The instruments are a new type of recording accelerometer, an instrument for recording the positions of the aileron, rudder and elevator in maneuvering the airplane. The use of these instruments, together with a recording air speed indicator, gives a complete history of the loads induced in an airplane when maneuvering or landing, together with the range of operation of the airplane controls. The information obtained is not only of great value to the designer but also will be very helpful in instructing pilots in the proper use of the controls when carrying out maneuvers.

Those Present

The meeting was presided over by Dr. Charles D. Walcott, Chairman of the National Advisory Committee for Aeronautics, and Secretary of the Smithsonian Institution. Mr. Paul Henderson, the newly appointed Second Assistant Postmaster General, in charge of the Air Mail Service, was present on invitation. The other members of the Committee present were: Dr. Joseph S. Ames, Chairman Executive Committee; Dr. S. W. Stratton, Secretary, and Director, Bureau of Standards; Maj. Gen. Mason M. Patrick, Chief of Air Service; Rear Admiral William A. Moffett, Chief of Naval Bureau of Aeronautics; Rear Admiral D. W. Taylor, Chief Constructor, U. S. Navy; Prof. Charles F. Marvin, Chief of the Weather Bureau; Dr. John F. Hayford, Northwestern University, Evanston, Ill.; Major Thurman H. Bane, Chief of Engineering Division Air Service; Dr. Michael I. Pupin, Columbia University, New York City; Orville Wright.

Radiophones on Mail Planes

An Air Mail plane piloted by Hamilton Lee on April 13 flew from Chicago to Washington, D. C., in the flying time of 6 hr. 2 min. As the distance between the two cities is 715 miles, the ship's speed averaged 119 m.p.h.

This ship was flown to the capital for the purpose of having installed as a part of its equipment radio sending and receiving telephones. This is the first of the transcontinental ships

Wide World Photo

Postmaster General Work (extreme right) inspects the radio equipment which is being installed on the Air Mail planes

to be equipped with a radiophone, but eventually all of the Air Mail ships are to be fitted with these instruments, which have a radius of 200 miles. With this radio telephone equipment the pi'ot will be in constant touch with the station just left and the one to which he is flying. There will also be a range finder to locate the station toward which he is flying during foggy and stormy weather.

In his new, blue uniform of the Air Mail Service, Pilot Lee caused a sensation at Army Air Service headquarters recently as some of the enlisted men thought he was a French aviation officer and saluted, much to his confusion.

Radio Concert from F3 Plane

An interesting demonstration of the possibilities of radio in airplanes was made on April 14 by the Netherlands Aircraft Corp. in connection with the American Legion drive for funds to erect a sanatarium in the mountains for ill and disabled service men. Miss Jeanette Vreeland, well known opera singer, was taken up in a Fokker F3 piloted by Bert Acosta, and gave several vocal selections over a 50 watt radio broadcasting set using a 507 m. wave length which was installed by the General Electric Co.

A Fokker F3 has also been engaged in connection with the 29th General Convention of the Society of Colonial Wars, to be held at Lakewood, N. J., May 5 and 6, to carry passengers to and from the convention from Monmouth, Trenton and Princeton. Major W. G. Schauffler, Jr., who is a member of the S.C.W. and traffic manager of the Netherlands Aircraft Corp., will probably pilot the plane on these flights.

A Letter

Editor, AVIATION:

It is with interest that I note your editorial in the April 10 number of AVIATION concerning the new Goodyear Type AC airship. As stated this ship is a distinct step in advance. The design is clean cut and correct engineering principles have been employed throughout. However I cannot fully agree with some other points and desire to submit the following observations for your consideration.

Fire hazards with respect to airships are caused by both hydrogen and gasoline. Let us compare the new Type AC ship with older types of twin-engined nonrigid ships.

The older types often have the gasoline tanks overhead in the bag with gravity feed. A broken or melted gasoline connection may pour the contents of one or more tanks into the car. The AC type has pump feed to a small tank in the engine compartment and with the engines shut down there is not over a gallon of gasoline to sustain a fire in the motor compartment.

The open car ship of the older type has only a few feed of open air space between the engines and the envelope. The new ship has the engines enclosed in a car with a gas tight and asbestos covered roof. It is true that the car is of wooden construction but wood is relatively slow burning compared with fabric, hydrogen or gasoline.

The enclosed engine compartment with its small cubic contents lends itself to retaining fire extinguishing gases, thereby more readily smothering a gasoline fire around the engines. The forced draught fans for filling the ballonet and cooling the exhaust pipes draw air from the compartment making it necessary to open the windows little if any in flight. With the engines stopped, as they will be in the event of fire, and the windows but slightly open, there will be but small air circulation thus making it possible to extinguish a gasoline fire which perhaps could not be done on an older type of ship.

The design of the AC type with its tight fireproof roof, with ten inches of air space between the roof and envelope well ventilated, and the ballonet over the whole area of the car, is surely the answer against hydrogen being by any chance forced into the car and around the engines.

With reference to the transmission system, it is stated that the entire weight of the transmission units are less than the weight of the outrigger engine supports used on older twin-engined ships. Tests have also shown that the increased propeller efficiency more than makes up for the transmission losses.

The real answer is the performance. With a short stubby envelope the speed is 45 m.p.h. with one engine and 65 m.p.h. with both engines running. Finally, can the ship be very heavy when it has such wonderful lift and great radius of action?

It is to be hoped that, with the AC as a start, other ships along this line will be developed and that this type of ship will be followed by a succession of similar designs, each more nearly approaching the best possible type of nonrigid airship.

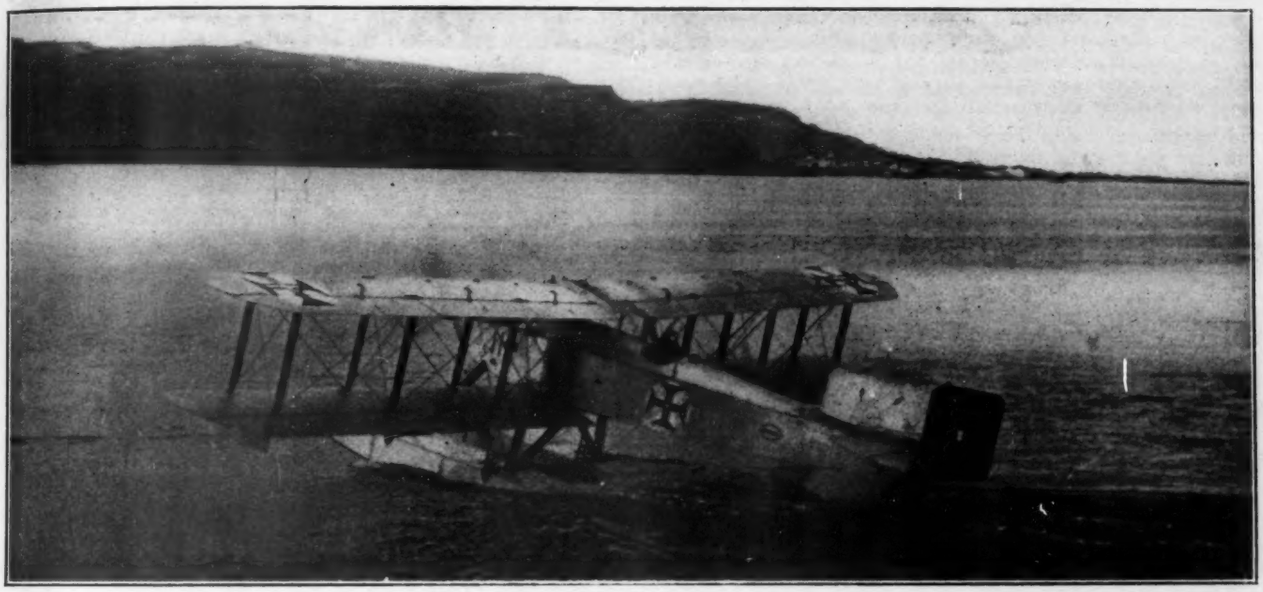
R. C. PIERCE
Formerly Capt. A.S.M.A.

Portugal to Brazil Flight

Captains Sacadura Cabral (whose name press dispatches first gave as Sacadura) and Gago Coutinho, of the Portuguese naval air service, have been forced to abandon their gallant attempt to reach Pernambuco, Brazil, when their seaplane was severely damaged upon beaching at St. Paul's Rock, in the South Atlantic, which the two fliers reached after a 12-hr. flight over a stretch of water devoid of any land.

The two fliers flew on April 17 from St. Vincent, Cape Verde Islands, to Porto Praya, in the same archipelago, a distance of about 200 miles, which they covered in 2½ hr.

They left Porto Praya at 5:50 a. m. on April 18 heading for St. Paul's Rock, about 900 miles away, where they landed at 8 p. m. On landing the machine was unfortunately damaged to such an extent that it became impossible to resume the journey in the direction of Fernando Noronha, 350 miles away, whence only 378 miles separated them from the South American mainland.



Wide World Photo

The special Fairey seaplane which Captains Cabral and Coutinho flew from Lisbon, Portugal, to St. Paul's Rock in an attempt to reach Pernambuco, Brazil

The seaplane "Lusitania" which Captains Cabral and Coutinho were flying was, as has been foreshadowed in AVIATION, the special type of Fairey floatplane which was recently launched in England and which is shown in the accompanying illustration at the moment of leaving Lisbon.

This seaplane is a modification of the Fairey C3D, and has a span of 62 ft. and an overall length of 36 ft. 6 in. The engine is a 375 hp. Rolls-Royce "Eagle" and the fuel supply permits of a continuous flight of 18 hr. At the trials in England the machine developed a high speed of 95 m.p.h. with a wing loading of over 10 lb./sq. ft. and a power loading of 19 lb./hp., and the low speed 48 m.p.h. The weight empty is 4150 lb., and the weight loaded 7250 lb.

According to latest advice, the Portuguese government has decided to ship a new seaplane to St. Paul's Rock so the two aviators may complete their flight to Brazil, a matter of 700 miles with one intermediate stop.

ARMY AND NAVY AIR NEWS

Air Service

Air Service Recruiting—The present authorized strength of the Air Service is 10,300 enlisted men, while the approximate number now enlisted in the Service is 9400. A large number of its experienced men, however, will be separated from the Service in the next two or three months, due to the expiration of enlistments. It is hoped that many will re-enlist.

The examinations for the lighter-than-air instruction course scheduled to begin about Sept. 25, and the heavier-than-air, to begin July 1, are still going on. Candidates are being accepted from the Army and civil life, provided they are within the age limit of twenty to twenty-seven years, inclusive, and have a high school education or the equivalent thereof. At the present time there are 140 cadets in the Service against the authorized cadet strength of 276, and from these figures there are approximately 136 vacancies which can be filled. Both courses normally last about a year, at the end of which if the cadet has satisfactorily completed his course of training, he will be commissioned a second lieutenant of the Reserve Corps (inactive status) and discharged as a cadet.

* * *

Citation for Gallantry in Action—By direction of the President the following-named enlisted man is cited for gallantry in action, and two silver stars may be placed upon the ribbon of the Victory medal awarded to him. The citation is as follows:

James Coakley, corporal, 5th Balloon Company, Air Service. For gallantry in action near Pont-a-Mousson, France, Sept. 12, 1918. With admirable nerve and courage, Corporal Coakley dashed underneath a falling burning balloon and, at the risk of his life, succeeded in rescuing the basket of instruments, maps, and photographs.

For gallantry in action at La Besace, France, Oct. 23, 1918. With utter disregard for his own personal safety, Corporal Coakley rescued a basket of instruments, maps, and photographs from a falling burning balloon. His devotion to duty and his determined and courageous work were an inspiration to the men and a great benefit to the service.

* * *

Carlstrom Field—The records from the flying office at Carlstrom Field, Arcadia, Fla., show that the flying time for February totalled 1563 flying hours. Some 93 student officers and cadets are at present undergoing flying instruction. These students are equally divided between two stages, and a force of fifteen dual instructors are instructing from the two stages. The present class of students will probably be the last one to learn to fly in Florida, due to the expected moving of the Primary Flying School.

* * *

Fairfield Air Intermediate Depot—At Fairfield Air Intermediate Depot, Fairfield, O., Captain Adler in a DH4B and Lieut. Ballard in a Fokker were the participants in a very interesting race recently. This race was the result of a boast by Lieutenant Ballard that the Fokker (which is his personal pride) could outrun any other ship on the post. Lieutenant Ballard's challange was immediately taken up by Capt. Adler, with the result that the Fokker did everything which Lieutenant Ballard boasted of. Lieutenant Ballard will have an opportunity to uphold the qualifications of the Fokker in the very near future, when the Orenco ship, which is nearing completion, is given its initial flight at this station. From all indications and reports it is then assumed Lieutenant Ballard will have an opportunity to contest against what is stated to be one of the fastest ships in the Air Service.

Crissy Field—The shortage of enlisted personnel which has made it difficult properly to perform the many and varied Post duties, should be considerably relieved by the addition of forty Air Service casuals who arrived at the Field Saturday morning, April 1, from Ft. McDowell. These men have just returned from the Philippine Department, and are being held here pending their discharge which, in the majority of cases, will be accomplished on or before July 1 of this year.

* * *

Mather Field—Two five-ship formations joined in the welcome given General Joffre at San Francisco on April 6. The first formation represented the 28th Squadron (Bomb.); its pilots were Capt. F. I. Eglin, Lieuts. W. S Sullivan, G. A. McHenry, A. E. Waller, Cadet Pierce and their enlisted mechanics. The second formation represented the 9th Squadron (Obs.); the pilots were Lieuts. R. L. Manghan, H. C. Minter, P. L. Williams, C. H. Myers and Corp. Larsen. Upon arriving at a designated position over San Francisco, these two formations became part of a large one flying over the parade.

* * *

The 318th Pursuit Group Reserve—The 318th Group, Pursuit, Organized Reserves, with headquarters in Indianapolis, has three squadrons, the 462nd, 463rd and 464th in Indiana (Kokomo, Wabash and Indianapolis) and the fourth, the 465th, at Louisville, Kentucky. At present there is only one Regular Army Air Service officer detailed with the Group.

The 464th Squadron at Indianapolis is the only organization nearly approaching its full complement of officers. Some enlisted men have already been signed up by recruiting officers appointed within this squadron, and all details pertaining to the squadron are being studied and rapidly mastered by the flight officers in order that the unit may begin to function as such. The remaining squadrons in Indiana have only enough officers assigned, or available for assignment, to compose a full flight in each.

The Aero Club of Indianapolis, most members of which are numbered among the personnel of the 464th Squadron, are endeavoring to acquaint all former service men, by personal contact and publicity gained in their activities, of the fact that the 464th is going to fly—and very shortly. The dedication of Schoen Field on March 26, was attended by all members of the organization. Schoen Field, at Fort Benjamin Harrison, is named in honor of an Indianapolis officer who was shot down overseas. This dedication marked the first official appearance of the 464th.

One steel hangar is being erected at the field, and material for two more will arrive shortly. There will be about ten JN6H planes, one DH4B, and probably a Fokker, for use by the squadron this spring and summer. This should increase the enthusiasm and esprit, not to say applications for Reserve Commissions.

* * *

Reduction of Master Sergeants, Air Service—At the present time there are only seventeen surplus master sergeants in the Air Service. During the past few months this number has been reduced from thirty-five. The present surplus is expected to be further reduced by a few retirements due between now and June 30. There remain several vacancies in this grade in the Philippine Department. These vacancies can be filled only by transfers from the United States for the reason that the Air Service has a surplus in this grade, as stated above. A few transfers have been made to the islands, and it is not expected that there will be any difficulty in filling these places, as there are many men desiring foreign service.

Army Orders—Majors Frank M. Andrews, John D. Reardan, Rush B. Lincoln, Wm. H. Garrison, jr., Henry H. Arnold, Millard F. Harmon, jr., Wm. L. Moose, jr., Earl L. Naiden, A. S., have been relieved from their present assignment and duty, and will proceed to Fort Leavenworth, Kan., and report in person not before Sept. 1, 1922, and not later than Sept. 4, 1922, to the commandant of the General Service Schools for duty as a student officer at the School of the Line for the year 1922-23.

The transfer of First Lieut. Ernest Wykeham Dichman, Corps of Engineers, to the Air Service on March 9, 1922, with rank from Dec. 4, 1918, is announced. He will remain on present duty until further orders.

The rating of Maj. Ora M. Baldinger, Inf., as a junior military aviator from Jan. 7, 1920, is announced.

The resignation of First. Lieut. Norman Reuben Wood, A. S., of his commission as an officer of the Army, is accepted by the President.

First Lieut. Edwin R. Page, A. S., is relieved from further treatment at Walter Reed General Hospital, Takoma Park, D. C., and will return to his station, Washington, D. C.

The transfer of First Lieut. John Sanderson Crawford, A. S., to the Infantry on March 28, 1922, is announced.

Lieut. Col. William E. Gillmore is relieved from duty in the office of the Chief of Air Service, this city and will proceed to New York City and report in person to the commanding general Second Corps Area for temporary duty pending the departure of the transport scheduled to sail on or about July 20, 1922, for San Francisco, Calif., and will sail on that transport. Upon arrival in San Francisco Lieutenant Colonel Gillmore will report in person to the commanding general Ninth Corps Area for duty as air officer.

First Lieut. Herbert H. Harris, A. S., (Infantry), is relieved from duty at Carlstrom Field, Arcadia, Fla., and by direction of the President from further detail in the Air Service. He is assigned to the 29th Infantry and will proceed to Fort Benning, Ga.

Capt. Frank H. Pritchard, A. S., now at Post Field, Fort Sill, Okla., is relieved from further duty at Carlstrom Field, Arcadia, Fla., and will report in person to the assistant commandant Post Field, Fort Sill, Okla., for duty.

Capt. John W. Kelley, A. S., now on leave of absence at Vernon, N. Y., is relieved from duty at Post Field, Fort Sill, Okla., and will proceed at the expiration of his present leave to Pope Field, Fayetteville, N. C., and report in person to the commanding officer for duty.

First. Lieut. George H. Brown, A. S., is directed to report in person to the commandant Air Service Mechanics School, Chanute Field, Rantoul, Ill., for duty.

Capt. William E. Farthing, A. S., is relieved from duty at the Air Service Pursuit School and from further duty at Ellington Field, Tex., and will proceed to Mitchel Field, L. I., N. Y., and report in person to the commanding officer for duty.

Naval Aviation

Navy Orders—Lt. (jg) Paul C. Warner, det. Naval Air Station Pensacola, Fla.; to duty Bu. Aeronautics, Navy dept., Washington, D. C.

Lt. Comdr. Ralph F. Wood, det. Naval Air Station Pensacola, Fla.; to command Naval Air Station Coco Solo, C. Z.

Lieut. Hugh C. Frazer, det. Naval Torpedo Station Newport, R. I.; to duty Air Squadrons, Atlantic Fleet.

Lieut. Victor S. Armstrong (Medical Corps), det. Medical Research Laboratory & School for Flight Surgeons, Mitchell Field, Mineola, N. Y.; to duty Naval Medical School, Washington, D. C.

Lieut. Louis Iverson (Medical Corps), det. Medical Research Laboratory & School for Flight Surgeons, Mitchell Field, Mineola, N. Y.; to duty Naval Medical School, Washington, D. C.

Lieut. Julius F. Neuberger (Medical Corps); Lieut. Page O. Northington (Medical Corps); Lieut. Carl J. Robertson (Medical Corps), det. Medical Research Laboratory and School for Flight Surgeons, Mitchell Field, Mineola, N. Y.; to duty Naval Medical School, Washington, D. C.

Hampton Roads Naval Air Station—The Naval fliers attached to the aircraft carrier Langley during the past week executed 157 precision landings in practicing for their future work in deck landing when the Langley finally goes to sea. Seven landings were made on the dummy deck laid down at the station with an Aeromarine plane, and two practice runs with a DH4B were also made. A VE5 made a radio test flight to Washington and return.

The hydrogen inflation of the C7, which was formerly filled with helium, was begun on April 4 and completed in a little over ten hours. The ship was ready for flight on April 11.

To date the Hampton Roads hydrogen plant has produced 97,000 cu. ft. of gas, but was shut down temporarily awaiting the installation of new agitator gears.

Marine Corps Aviation

M. C. Flying Field, Quantico, Va.—Three members of the Marine Corps Flying Service were killed when two airplanes collided above Quantico, Va., on April 17, while engaged in battle practice. The dead are 1st Lieut. Earl M. Randall, who was alone in a Fokker; 2d Lieut. Duncan W. Lewis, who was piloting a Vought VE7, and Private Joseph J. Dhooghe, who was acting as observer.

The two planes which had been flying around each other, seeking to get above and behind each other simulating a "dog fight," collided at an altitude of about 4000 ft., as they came side by side. Their wings interlocked and then broke off entirely, and the two planes were said by witnesses to have fallen sidewise to the ground.

* * *

Fourth Air Squadron, Port au Prince, Haiti—Three more emergency landing fields on direct air lines to various stations have been prepared and marked by the Gendarmerie in the southern district.

Twelve parachutes, seat type, have been received and are being carried against the possibility of fire, though it is generally considered safer with a forced landing in the mountains to remain with the plane.

Fourteen witnesses were brought in by plane from Hinche, San Michel and Cape Haitian to appear before a board of investigation. They were then returned to their stations.

Captain Page after testing a parachute (seat type pack) with weights jumped from the wing of a JN and landed safely but too hard for comfort.

Coming Aeronautical Events

AMERICAN

Apr. 30 — Spring Show and Opening Meet, Curtiss Field, Mineola, L. I.

May 30 — Fourth Annual Aircraft Exhibition, Logan Field, Baltimore, Md.

May 31 — National Balloon Race, Milwaukee.

June 15-17 — Flying Meet, Monmouth, Ill.

Sept. 4 (about) — Detroit Aerial Water Derby, Detroit. (Curtiss Marine Flying Trophy Competition.)

Sept. 15 (about) — Detroit Aerial Derby, Detroit. (Pulitzer Trophy Race.)

Sept. 30 — First Annual Interservice Championship Meet. (In preparation.)

FOREIGN

August — Coupe Jacques Schneider. (Seaplane speed race.) Naples, Italy.

Aug. 6 — Gordon Bennett Balloon Race, Geneva, Switzerland.

Aug. 9-24 — Soaring and Gliding Competition, Gersfeld, Germany.

Sept. 22 — Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.

American elimination trials, if required, to be held about Aug. 15, at Mitchel Field, L. I.

Foreign News

Australia—An English correspondent states that arrangements are being made by the Australian Government to establish this year two aerial defense bases, in Victoria and New South Wales. Developments in this direction have recently been facilitated by the acquisition by the Commonwealth Government of 128 airplanes of various types as a gift from the British Government.

It is the declared policy of the Australian Government to establish aerial defense bases in all the States of the Commonwealth as finances permit, and with this object in view the Victorian base is to be constructed so as to form a headquarters for all the State units. Here there will be a large depot for equipment and stores, and a training school for pilots, observers and aerial gunners.

Plans are also being made to establish a seaplane unit at Sydney to work in cooperation with the Navy. Nearly all the equipment needed for this unit has been given by the British Government.

• • •

Finland—The American Consul at Helsingfors states that during 1921 there were two commercial aviation companies operating in Finland, the Flyg A/B and the Flygtrafik A/B, a merger of which is now under consideration. The former operated two French Caudron seaplanes, one of which could carry two passengers and the other only one. These planes proving unsatisfactory for the purpose because of their construction were sold to the Finnish military authorities, and the company intends to procure new planes for next season. Flights aggregating 63 hr. were made between April and September, when flying was stopped by unfavorable weather conditions; a total of 260 passengers was carried without accident. The Flygtrafik had no planes of its own, but rented a German Junker from a Swedish company, and carried about 200 passengers.

Owing to depreciation of Finnish currency and the consequent high cost of airplanes procured from abroad, an airplane factory for the military authorities was built last year in the dry dock division of Sveaborg, just outside of Helsingfors; some repair shops were already located there. It is intended hereafter to build in Finland some of the seaplanes needed for military purposes; but motors for these must be imported for the present, although a factory for the construction of motors is also under consideration. There is also a complete repair shop for airplanes at the military station on Sandhamm Island, where all military machines are brought for important repairs, new machines inspected and trial flights made.

• • •

Germany—The work of disarming Germany in the air is ended, according to a correspondent of the London *Daily Mail*. All but twenty of the British, French, Italian, Belgian and Japanese officers, who have worked under General Masterman on the Inter-Allied Commission of Aeronautical Control, have left Germany. On May 5 the Commission will cease to exist.

Since January, 1920, when General Masterman arrived in Germany, the Commission has destroyed 14,800 airplanes. Of 29,500 engines dealt with, some have been handed over to the Allies, but most of them have been destroyed. Six airships have been handed over to the Allies.

The work of the Commission has been done under great difficulties; never before had the work of disarming a nation been undertaken. When General Masterman demanded a list of places where sheds, works, and airplanes were to be found, the authorities declared that the papers had been lost during the revolution. Only little by little was the necessary information collected.

General Masterman's work is ended, but the control of civil aviation in Germany is to continue. The Council of Ambassadors has not yet published the regulations to be imposed. It is certain that there will be a small permanent Commission with the right of inspection to see that manufacture is carried out within the lines to be prescribed for future German aircraft.

Where to Fly

CALIFORNIA
SAN FRANCISCO, CALIFORNIA
EARL P. COOPER AIRPLANE & MOTOR CO.

ILLINOIS
CHECKERBOARD AIRPLANE SERVICE
FOREST PARK, ILLINOIS

INDIANA
One of the largest and best equipped flying fields in the United States.
CURTISS-INDIANA COMPANY
Kokomo, Indiana
ALL TYPES OF CURTISS PLANES.

MASSACHUSETTS
BOSTON AND SPRINGFIELD, MASS.
EASTERN AIRCRAFT CORP.
340 FIRST ST., BOSTON, MASS.

MINNESOTA
WHITE BEAR LAKE, MINN.
The Twin Cities' chief summer resort.
Harold G. Peterson Aircraft Company
SCHOOL OF AVIATION

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